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ORIGINAL ARTICLE

# Total hip arthroplasty for osteoarthritis in patients aged 80 years or older: Influence of co-morbidities on final outcome

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## KEYWORDS

Total hip arthroplasty;  
Morbidity;  
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## Summary

**Background:** In osteoarthritic patients aged 80 years or older, total hip arthroplasty (THA) offers well-established benefits; however this selective group of population is known to carry a high morbidity rate.

**Hypothesis:** The higher morbidity rate carried by this group does benefit more from identification of risk factors than from improved surgical and anesthesia techniques.

**Materials and methods:** Seventy-two patients, operated between October 2003 and December 2006, were retrospectively analyzed. The interventions performed on the traction table, through an anterior approach, involved implantation of a cemented total prosthesis combined to a retentive, cemented acetabular component.

**Results:** At an average delay of 31 months (minimum 5 months, maximum 54 months), no patient was lost to follow-up and no prosthesis had to be revised. In total, 19 patients presented 27 complications, which were not influenced by their American Society of Anesthesiology (ASA) score ( $p > 0.1$ ) nor by the presence of co-morbidities ( $p > 0.5$ ). No perioperative deaths or infection occurred. Twenty-eight patients required blood products transfusion. ASA score ( $p < 0.03$ ) and body mass index  $< 25$  ( $p = 0.01$ ) appeared to be risk factors for transfusion. Seventeen patients were pain-free and walked without restriction, and 19 had a Merle d'Aubigné score under 15. We noted two isolated dislocations (2.6%). Eleven patients were hindered in their walking ability by an associated orthopaedic condition and five by unrelated medical problems. Although preoperative ASA score did not seem to be of predictive value to the quality of surgical outcome ( $p > 0.5$ ), the occurrence of an associated orthopaedic condition ( $p < 0.001$ ) and, even more the patient's categorization in Charnley class B or C ( $p < 0.001$ ) strongly correlated to this outcome quality.

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*Discussion:* While THA for the treatment of osteoarthritis in patients older than 80 years exposed them to a complication rate of 27%, no specific risk factor was identified. Other neuro-orthopaedic disorders hampered the quality of the functional outcome. The use of a retentive cup could not eliminate the occurrence of two dislocations (2.6%).

Level of evidence IV: retrospective therapeutic study.

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## Introduction

As of January 1, 2008, the French National Institute for Statistics and Economic Studies estimated that the French population over age 80 years was about three millions, and their expected longevity was 8 years for men and 9 years for women. Thus, more and more octogenarians may undergo total hip arthroplasty (THA) for the treatment of osteoarthritis in coming years, especially since the noticeable decrease in operative mortality [1] is leading to increasingly rare anaesthetic contraindications. Although the benefits, particularly in pain relief, from these interventions do not need to be demonstrated any more, numerous studies [2–10] have reported significant postoperative medico-surgical complications not systematically predictable by preanaesthesia consultation. Thus, evaluation of the postoperative risks, and the consequences of associated orthopaedic or non-orthopaedic pathologies, on the functional outcome of operated patients is assuming increasing significance in surgical decision-making. As most series on hip prosthesis in patients over age 80 years date back to pre-1990, it appeared interesting to us to review our recent experience by:

- describing complications in a population of octogenarians with total prosthesis for the treatment of osteoarthritis by applying modern anaesthesia-resuscitation protocols;
- determining if the risk factors of complications and of the functional prognosis could be identified, to help in surgical decision-making;
- improving the quality of patient data on potential risks and targeted functional outcomes.

## Patients and methods

Among 723 primary hip prostheses implanted in our institution between October 2003 and December 2006, 75 were received by 72 patients aged 80 years and more and who were the subject of retrospective analysis. Twenty-six of them were men, and 46 women. Two women and one man underwent bilateral interventions. Average age was 82 years (minimum 80, maximum 93 years). The general state of these patients was evaluated according to the score of the American Society of Anesthesiology (ASA). Twenty-seven patients were scored as ASA 2, and 45 as ASA 3. None had ASA scores of 1 or 4. The functional score of these patients was evaluated preoperatively according to the classification of Charnley [11], which counted associated orthopaedic pathologies as well as general pathologies that could affect deambulation. Fifty patients were class A, six class B, and 16 class C. The body mass index (BMI, weight/height<sup>2</sup>) of each

patient was measured according to World Health Organization criteria. Average BMI was 25.3, with a minimum of 17.7 and a maximum of 33.8. Thirty-six patients were considered to be normal, 27 were overweight, and nine had average obesity.

Sixty-two patients manifested 1 or more co-morbidities (Table 1). Twenty-seven patients had one co-morbidity, 17 had two, and 18 had three or more.

Before all interventions, and with the usual anaesthetic evaluation, all patients underwent dental and urinary profiling to detect infectious sources that were eradicated systematically.

All patients received a cemented femoral implant (Sapia®, Tornier, Saint-Ismier, France), a 28-mm stainless steel ball and cemented, retentive acetabular component. Palacos cement, with Gentamycin™ (Schering Plough, Brussels, Belgium) added, was introduced by syringe in the femoral canal after obstruction with a polyethylene obturator (Tornier, Saint-Ismier, France).

Antibioprophylaxis with first-generation cephalosporine was used for 24 hours. Thromboembolic accidents were prevented with low-molecular weight heparins for 1 month in association with compression stockings. Doppler control was established postoperatively in a systematic manner, to find thromboembolic complications [12]. Because of patient age in this series, prophylaxis against periarticular ossification by anti-inflammatory agents was never instituted. Walking with support was authorized the day after the intervention, except when associated acetabular autograft (5 cases) were performed which delayed walking by 1 month.

Patients were reviewed at 3 months postoperatively, then every year, and evaluated according to the criteria of Merle

**Table 1** Co-morbidities.

Co-morbidity	Number
Arterial hypertension	35
Non-ischæmic cardiopathy	12
Ischæmic cardiopathy	11 (7 of them were treated with stents)
Lower limb arteritis	3
Chronic respiratory insufficiency	6
Antecedent phlebitis	5 (1 of them with pulmonary embolism)
Cognitive problems (Alzheimer)	2
Type 2 diabetes	3
Minor haemophilia	1
Renal insufficiency	3 (1 dialysed 3 times a week)

**Table 2** Perioperative and late complications.

Major complications	Minor complications
1 postoperative cardiac arrest	8 urinary retentions
1 haematoma with surgical review	3 disorientations
2 late dislocations (9 and 18 months)	4 cardiac rhythm problems treated medically
	1 Ogilvie's syndrome
	1 transient renal insufficiency
	1 distal venous thrombosis
	2 electrolyte problems
	3 periprosthetic ossifications rated 2 according to Brooker

d'Aubigné [13]. Statistical analysis was performed with Sigmasat™ software. Student's *t* test was used to compare means. In case of abnormal distribution, the Mann-Whitney test was applied for statistical calculations. The two populations were compared by Chi<sup>2</sup> test, with Yates corrections for small numbers. ( $p < 0.05$  values were considered to be statistically significant).

## Results

### Complications

No patient died immediately after or during the intervention. Nineteen patients presented 27 complications (Table 2). Four patients had major complications, and 15 had 23 minor complications. Complications occurred in nine patients rated ASA 3 and 10 in rated ASA 2, but without any statistically significant difference ( $p > 0.1$ ). Co-morbidities never influenced the occurrence of complications whether they were minor or major ( $p > 0.5$ ).

Two patients (2.6%) had a late isolated dislocation (9 and 18 months after the intervention) while washing their feet. Tomodensitometric and radiological measurements for implant positioning revealed acetabular anteversion to 17° and 10°, and femoral anteversion to 12 and 7°, respectively.

Acetabular inclination was 40° and 47°. The dislocations were reduced by external maneuvers, without the need for additional surgery. No infection, either superficial or profound, was encountered.

Twenty-eight patients were transfused with 63 bags totally. While anticoagulant or antiaggregant administration did not appear to be a risk factor of bleeding ( $p > 0.5$ ), BMI less than 25 was found to be a significant risk factor ( $p \approx 0.01$ ) (Table 3).

### Clinical results

Average follow-up was 31 months (minimum 5, maximum 54 months). No patient was lost to follow-up. Two patients died, at 5 and 36 months respectively, with no connection to the intervention. No prosthetic revision, whatever the cause, was foreseen or took place. At maximum follow-up, 48 patients were reviewed on consultation for clinical and radiographic evaluation. Twenty-two patients were contacted by telephone and responded to a questionnaire.

Average duration of hospitalization was 10.3 days (minimum 7, maximum 14 days). Seventeen patients were pain-free and walked without restriction. Thirty-six patients scored between 15 and 17; of them, 27 complained of transient pains in association with the use of a cane "for safety" purposes when going out for 12 of them. Among these patients, five had an excellent clinical evaluation of their hip but were limited, by arteritis in one case, by cardiopathy in two others, by a narrow lumbar canal in the fourth case, and by chronic respiratory insufficiency in the fifth patient.

Nineteen patients had a Merle d'Aubigné score under 15. All were satisfied with their intervention and did not have or had very little pain. Two patients aged over 85 years used a cane permanently and did not walk for more than 15 minutes outside their residence. One patient of 95 years did not ever leave his home.

Eleven were limited by an associated orthopaedic pathology (6 contralateral hip osteoarthritis, 1 loosening of a contralateral THA, 3 arthroses of the knee, 1 non union of a femoral neck fracture), which reduced the walk perimeter and required the permanent use of two canes.

Five were limited by medical problems (2 cases of evolving Parkinson disease, 1 balance problem, 1 major cardiac insufficiency, 1 lung cancer).

**Table 3** Relationship between number of patients transfused and BMI, ASA score and preoperative anticoagulants or antiaggregants use.

	BMI < 25	BMI ≥ 25	Level of significance
Patients transfused/total number	20/39	8/36	$p = 0.01$
	Patients on anticoagulants or antiaggregants	Patients not taking anticoagulants or antiaggregants	
Patients transfused/total number	6/19	22/56	NS
	ASA 2	ASA 3	
Patients transfused/total number	14/28	14/57	$p = 0.03$

**Table 4** Functional result (Merle d'Aubigné score) in relation to associated orthopaedic pathologies.

Associated orthopaedic pathologies/total number	Score $\leq 15$ 11/19	Score $> 15$ 1/56	( $p < 0.001$ )
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**Table 5** Functional results (Merle d'Aubigné score) in relation to Charnley's classification.

Charnley's classification	A	B	C
Postel-Merle d'Aubigné hip score	17.1 (minimum 15, maximum 18)	14.6 (minimum 14, maximum 15)	15.25 (minimum 10, maximum 17)

Whereas preoperative ASA score did not allow us to evaluate the consequences of a precarious general state on the quality of the functional results of a THA ( $p > 0.5$ ), the occurrence of an associated orthopaedic pathology strongly conditioned the quality of the intervention (Table 4) ( $p < 0.001$ ). More generally, Charnley's classification appeared to be the most relevant. The functional results in class A patients, according to the Postel-Merle d'Aubigné hip scoring system, were statistically greater than those of class B ( $p < 0.001$ ) or C ( $p < 0.001$ ) (Table 5).

## Discussion

The frequency of complications occurring after THA in patients over age 80 years varies from 24% [8] to 42.5% [14] compared to the rate of about 8% for the general population [15–17]. If, however, aseptic unsealing and wear are the main causes of revision in patients of all ages, the problems remain secondary in patients over age 80 years [18] as long as a cement or hybrid implant is used (cement femur, cementless cup). Perioperative mortality in patients older than 80 years, although 10 times lower in 1999 than in 1978 [10], remained significant between 0.4% [17] and 3.7% [19]. We did not observe any perioperative deaths, despite the usual level of co-morbidities [6,8,10], but the size of our series did not allow us to draw any definitive conclusion.

The main causes of THA revision in patients over age 80 years are, according to the Finnish Registry [18], infections or dislocations. No deep or superficial infection was recorded in our study, although the rate could reach 7.5% [3]. Newington et al. [2] have demonstrated the deleterious effect of a dislocation and its possible "snowball effect". Even if the dislocation level in our series remains modest [2.6%] and no patient had a recurrence, the use of a retentive acetabular component and an anterior approach known to be less "dislocating" [20–22] does not prevent their occurrence and requires, importantly, that we pay attention to postoperative patient education. In fact, no explanation for these dislocations has been found, except that they are produced during flexion-internal rotation movements that should be avoided. Finally, unlike the dislocations observed with double mobility cups [23,24], the current were always reduced by external maneuvers.

In the framework of surgery for the treatment of hip osteoarthritis, we have not found evidence correlating the occurrence of perioperative complications and ASA score or

co-morbidities. Our series was too limited to arrive at a definitive conclusion, but was in concurrence with the findings of Perka et al. [25] in more than 600 interventions. Only BMI less than 25 has to be apparently taken into account for an eventual perioperative transfusion.

If the effect of THA on pain does not need to be demonstrated any longer, the global functional score of Merle d'Aubigné remains irregular in our experience and varies from 10 to 18 in function, notably with associated orthopaedic or general pathologies. Charnley's score seems to be particularly relevant in foreseeing the functional outcome of hip arthroplasty in patients older than 80 years and informing them about the autonomy that they may likely recover.

## Conclusions

Our experience shows that even if the level of complications after THA in patients over the age of 80 years is more significant than for unselected patients, it does not raise doubt about the quality of the functional results. We were unable to highlight the risk factors of these complications. However, our study demonstrates the close relationship between the global functional score and of associated pathologies. In this framework, Charnley's classification is very interesting in deciding an intervention and informing patients of their possible outcome.

## Conflicts of interests

None.

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